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Peer-Delivered Interventions Reduce HIV Risk Behaviors among Out-of-Treatment Drug Abusers

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S Y N O P S I S

Objective. The purpose of this chapter is to describe the results of a randomized study (funded by the National Institute on Drug Abuse [NIDA]) comparing a peer-delivered enhanced intervention to the NIDA standard intervention for reducing human immunodeficiency virus (HIV) risk behaviors.

Methods. Data come from the ongoing St. Louis EachOneTeachOne (EOTO) study on HIV risk behaviors among out-of-treatment crack cocaine users and injecting drug users (IDUs). The study has a randomized prospective design, and for this chapter, three risk behaviors were analyzed—the frequency of crack cocaine use and the number of sex partners and condom use over the past 30-day period. We report the level of risk at baseline and at the three-month follow-up period to determine the proportion of individuals improving or worsening based on a dichotomous outcome in which remaining at low risk or decreasing moderate or high risk behaviors is considered “improving” and increasing risk behavior or remaining at moderate or high risk is considered “worsening.”

Results. Overall, 80% of the sample “improved” their crack cocaine use, meaning they maintained at low level or reduced their use. Although both the standard and enhanced intervention groups made substantial improvement in their crack cocaine use,

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individuals in the enhanced intervention group were statistically more likely to reduce their risk than those assigned to the standard intervention (83% vs. 76%, $P < 0.05$). As for the number of sex partners, 75% of the overall sample improved; that is, they reduced the number of sex partners or remained abstinent or in a one-partner relationship at baseline and follow-up. There was no statistically significant difference between the enhanced and standard groups (76% vs. 73%). Stratified by gender, the results showed a trend toward improvement among women assigned to the enhanced intervention compared with those assigned to the standard. In terms of condom use, the overall sample worsened more than it improved (65% vs. 44%), and no differences were found between the enhanced and standard groups.

Conclusions. These findings show that the use of peers as role models in promoting HIV risk reduction is feasible and effective among out-of-treatment drug abusers, particularly for drug use itself. Condom use was found to be more difficult to change than other behaviors. Possible reasons for this lack of improvement and suggestions for future interventions are given.

A nationwide study of more than 20,000 out-of-treatment drug injectors has shown that nearly 50% had never been in any type of treatment for their substance abuse.¹ Studies also have shown that substance abusers not in treatment report more high risk drug and sexual behaviors than those in treatment.² Consequently, intervention efforts have targeted out-of-treatment drug users who have not had the benefit of persistent prevention messages, relevant to their drug and sexual risk, through any formal treatment programs.

The Community Research Branch at the National Institute on Drug Abuse (NIDA) launched a multisite Cooperative Agreement for AIDS Community-Based Outreach beginning in 1990, to reduce the spread of the human immunodeficiency virus (HIV) among out-of-treatment drug abusers to address the concern that these drug users are a critical population in the spread of HIV. In response to rising rates of HIV and sexually transmitted diseases (STDs), and the urgent need to develop effective prevention messages for drug-using populations, each of the 23 Cooperative Agreement sites developed its own "enhanced" intervention to be compared to a single standard.

The St. Louis, Missouri, site is conducting its study in an area with an acquired immunodeficiency syndrome (AIDS) case rate of 18.8 per 100,000, a seroincidence rate of 1.4% (one of the highest among the Cooperative Agreement sites), a syphilis rate two times the national average for U.S. cities of comparable size, and a syphilis rate among African Americans 60 times the national average. According to Drug Abuse Warning Network (DAWN) data, which come from city emergency room and medical examiner and coroner reports, St. Louis has experienced an increase in cocaine- and heroin-related deaths. Thus, the St. Louis site proposed an intervention that would address this population, while expanding on the recruitment strategy used in a prior NIDA demonstration project titled "Efforts To Reduce the Spread of AIDS (ERSA),"³⁻⁵ in which street outreach methods were used to recruit subjects for free drug treatment.

The current project, funded in 1994 and called the St. Louis EachOneTeachOne (EOTO) study, examines rates of HIV risk behaviors and studies HIV risk reduction interventions among out-of-treatment drug injectors and crack cocaine users. EOTO focuses on the assessment of:

- HIV risk behaviors.
- Medical conditions prevalent among drug users (tuberculosis, syphilis, hepatitis B, and HIV).

- Characteristics of sexual and drug peer networks.
- Stages of readiness for changing behaviors.
- History of severity of substance use disorders and psychiatric symptoms.

The main focus of this chapter is the comparison of the peer-oriented enhanced intervention to a standard intervention (SI) for reducing HIV risk behaviors. Studies have shown that the use of peers as role models in the promotion of HIV risk reduction, such as reducing drug use and high risk sexual behaviors, is feasible and appears to be effective.⁶⁻⁸

Specifically, this chapter examines the differences between the NIDA Cooperative Agreement SI and the peer-delivered enhanced intervention used by the St. Louis site. Differences also are examined separately for men and women. Of note is the method for assessing change over time, which in this study is three months. Change is commonly reported as the group mean; however, in this analysis, change in behavior is stratified into two categories: improved condition or worsened condition. Such a classification is based on a matrix of levels of risk. Thus, building on our previous work⁴ and that of Beardsley and colleagues,⁹ where risk groups were compared with one another, we report the level of risk at baseline and the subsequent level at follow-up to determine the proportion of individuals improving (going from a high level of risk to a lower level), worsening, and staying the same. In prior analyses, staying the same would mean "zero" change; in these analyses, individuals are assigned either to a worsened or an improved condition depending on the baseline characteristic.

METHODS

Sample and recruitment. Data for these analyses come from the NIDA-funded St. Louis Cooperative Agreement site, an ongoing project that examines the rates of HIV infection and high risk behaviors among out-of-treatment crack cocaine and injecting drug users (IDUs) and evaluates the effectiveness of interventions aimed at reducing these behaviors. The EOTO study targeted two areas of St. Louis City with documented high rates of drug abuse, crime, and prostitution, according to police arrest data, and high rates of tuberculosis, hepatitis B, syphilis, and AIDS, as confirmed by the St. Louis Public Health Department. Two storefront satellite health centers for the St. Louis Public Health Department offices, called

HealthStreet, serve as home base for the EOTO project and interventions. The HealthStreet offices were established with funds from a prior NIDA study³⁻⁵ and continue to be funded under the auspices of the EOTO project.

Community health outreach workers (CHOWs) recruit out-of-treatment IDUs, crack cocaine users, and heroin smokers¹⁰ and work in pairs in predefined areas of the city, moving to a new zone approximately every two weeks. Their five- to 15-minute contact with each potential recruit involves:

- A brief description of the study, including eligibility criteria (age at least 18, current injection or crack cocaine drug use or heroin smoking to be validated by a urine test or needle marks, and no drug treatment within the past 30 days).
- Distribution of basic HIV-related literature and written HIV-related referrals.
- Distribution of HIV prevention packets (condoms, bleach, and literature demonstrating proper use of condoms and needle cleaning).
- Provision of information about non-HIV-related social services such as food stamps and Aid to Families with Dependent Children (AFDC).

Study protocol. Drug users are referred to HealthStreet for participation in the study. At this point, staff members from Washington University School of Medicine in St. Louis explain the study procedures, administer the informed consent, and conduct the interviews, which consist of an assessment of risk behaviors, psychiatric symptoms, network characteristics, and health service use. After participants are interviewed, they undergo the SI protocol developed by the NIDA Cooperative Agreement Final Cohort sites,¹¹ which involves educational information on risk related to cocaine use and transmission of HIV and STDs, the benefits of drug treatment, and the correct use of condoms and cleaning of injection equipment. The SI is delivered in two sessions about two weeks apart. The first of the two sessions consists of pre-HIV test counseling where the counselor (blinded to the interview responses) covers information from more than a dozen cue cards. This session, which lasts approximately 15 minutes, concludes with the drawing of blood for HIV testing. The second SI session includes post-HIV test counseling, reviews material presented in the first session, gives results of the test, and gives specific referral

information for HIV positives to the AIDS Clinical Trials Unit at Washington University School of Medicine. At this time, respondents also undergo random assignment to further intervention (a four-session peer-delivered intervention group) or the SI, which requires no further intervention action.

Although the peer-delivered intervention is referred to in this chapter as the Enhanced Intervention (EI), it is referred to as the "Group B" intervention with the respondents. The EI includes four two-hour sessions on drug awareness, stress management, AIDS (led by public health department staff), and ways to reduce high risk sexual behavior. All sessions are supervised by the research staff; however, the drug abuse and high risk sexual behavior sessions are conducted by peer counselors in recovery. The sessions each begin with a 10-minute booster session on HIV education. These sessions are followed by a didactic discussion, which also is led by peers. Meals, transportation, and babysitting services are provided to minimize participation barriers. Participation in the protocol requires a three-month postbaseline follow-up interview for respondents from both the SI and EI groups. Everyone receives remuneration for completing the assessments; persons who are randomly assigned to the EI are allowed compensation for each of the four required peer-delivered sessions they attend.

Statistical analyses. The sample for these analyses was restricted to persons who reported a lifetime history of crack cocaine use. As of July 1, 1997, 725 participants meeting this criterion have completed both baseline and follow-up. Excluding the first six months of the study, when the recruiting was just starting, the follow-up rate has consistently been higher than 95%. The analysis in this chapter includes data from the Risk Behavior Assessment (RBA), which covers the number of sex partners and frequency of crack cocaine and condom use.

To analyze change in behavior from baseline to the three-month follow-up, individuals were divided into one of 16 behavior category levels. These behavior levels were assigned on the basis of each individual's level of risk at baseline and follow-up. As shown in Table 1, in general, levels included no, low, moderate, or high risk behavior. Thresholds for risk definitions varied with the behavior but were set based on approximate quartile levels of frequencies for each specific behavior at baseline. As shown, change for the better is denoted by a plus (+) sign in the shaded area of the matrix; change for the worse is denoted by a minus (-) sign.

The risk-level categories also were collapsed into dichotomous levels (improved or worsened) based on the participant's reported risk behavior at baseline and follow-up; individuals who maintained a low level of risk or who reduced their risk from a higher level to a lower level were designated "improved," and individuals who maintained a high level of risk or who increased their risk from a lower level to a higher level were designated "worsened." For these analyses, the chi-square statistic was used to make comparisons between subgroups on the improved and worsened variables. Furthermore, these are "intent to treat" analyses, in that persons assigned to the EI who did not attend even one session are still considered to be in the enhanced group.

RESULTS

Sociodemographic characteristics. The sample of 725 crack cocaine users was 61% male, 93% African American, and 38.2 years old on average (Table 2). In addition, 52% reported at least a high school education, 18% were currently employed, and 41% were never married. The proportion considering themselves to be homeless was 15%; 77% reported being arrested or charged with a criminal offense in their lifetime. Also, as shown in

Table 1. Improved or worsened status change from baseline to follow-up

Level	At follow-up			
	None	Low	Moderate	High
At baseline None	+	-	-	-
Low	+	+	-	-
Moderate	+	+	-	-
High	+	+	+	-

+ = Improved
- = Worsened

Table 2. Sociodemographics of St. Louis EOTO subjects

Characteristics	Total		Standard		Enhanced	
	n	%	n	%	n	%
Male	442	61	196	64	246	60
African American	676	93	280	91	396	95
High school or more	374	52	165	54	209	50
Currently employed	132	18	62	20	70	17
Single (never married)	295	41	118	38	177	42
Consider themselves homeless	110	15	46	15	64	15
Lifetime history of arrests	560	77	244	79	316	76
N	725	100	308	42 ^a	417	58 ^a

^aPercent of total sample (N = 725)
 Mean age (SD): Total = 38.2 (7.2)
 Standard = 38.2 (7.1)
 Enhanced = 38.2 (7.4)

Table 3. Levels of crack cocaine use at baseline and follow-up
 St. Louis EOTO full sample (N = 725)

Level	At follow-up				Total (at baseline)
	None (0 times)	Low (1–20 times)	Moderate (21–57 times)	High (58+ times)	
None (0 times)	2 0%	1 0%	—	—	3 0%
Low (1–20 times)	90 12%	187 26%	25 3%	14 2%	316 44%
Moderate (21–57 times)	45 6%	97 13%	38 5%	23 3%	203 28%
High (58+ times)	42 6%	81 11%	35 5%	44 6%	202 28%
Total (at follow-up)	179 25%	366 51%	98 14%	81 11%	724 ^a 100%

^aOne case is missing crack cocaine data at baseline.

Table 2, 58% of the sample was randomly assigned to the EI. As expected due to the randomization, the two groups were not statistically different at baseline. Of those assigned to the EI, 17% did not attend even one session, 10% attended only one or two sessions, 4% attended three sessions, and 69% attended at least four of the required sessions. In fact, about 10% of those assigned to the EI attended at least one extra session.

Levels of crack cocaine use. At both baseline and follow-up, past 30-day use of crack cocaine one to 20 times was considered “low” risk, use 21 to 57 times was considered “moderate” risk, and use greater than 57 times was considered “high” risk (Table 3). Based on our definition

of overall improved and worsened status, 80% of the overall sample stopped, maintained a lower level of, or reduced their crack cocaine use. In fact, of the 405 individuals found to be at moderate or high risk at baseline, 26% (n = 105) remained at or increased their risk level. On the other hand, only 12% (n = 39) of the 316 individuals found to be at low risk at baseline worsened at follow-up. The remaining 277 baseline low risk individuals (88%) stopped or maintained their low level of crack cocaine use.

Tables 3a and 3b present the risk level of crack cocaine use at baseline and follow-up for both the SI and EI groups. As summarized in Table 3c, although both the standard and enhanced interventions were associated

Table 3a. Levels of crack cocaine use at baseline and follow-up
Standard intervention group (N = 308)

Level	At follow-up				Total (at baseline)
	None (0 times)	Low (1–20 times)	Moderate (21–57 times)	High (58+ times)	
None (0 times)	2 1%	—	—	—	2 1%
Low (1–20 times)	32 10%	79 26%	14 5%	8 3%	133 43%
Moderate (21–57 times)	18 6%	42 14%	17 6%	15 5%	92 30%
High (58+ times)	17 6%	27 9%	16 5%	21 7%	81 26%
Total (at follow-up)	69 22%	148 48%	47 15%	44 14%	308 100%

Table 3b. Levels of crack cocaine use at baseline and follow-up
Enhanced intervention group (N = 416)

Level	At follow-up				Total (at baseline)
	None (0 times)	Low (1–20 times)	Moderate (21–57 times)	High (58+ times)	
None (0 times)	—	1 0%	—	—	1 0%
Low (1–20 times)	58 14%	108 26%	11 3%	6 1%	183 44%
Moderate (21–57 times)	27 6%	55 13%	21 5%	8 2%	111 27%
High (58+ times)	25 6%	54 13%	19 5%	23 6%	121 29%
Total (at follow-up)	110 26%	218 52%	51 12%	37 9%	416 100%

Table 3c. Change in crack cocaine use between groups and by gender

	Overall			Men			Women		
	Standard (n = 308)	Enhanced (n = 417)	P	Standard (n = 196)	Enhanced (n = 246)	P	Standard (n = 112)	Enhanced (n = 171)	P
Percent improved	76%	83%	0.015	76%	85%	0.017	75%	80%	NS

overall with substantial improvement in crack cocaine use (reducing use or improving to or maintaining a low risk level), persons in the EI group were statistically significantly more likely to reduce their risky crack cocaine use than those assigned to the SI (83% vs. 76%). A closer look at the data (Tables 3a and 3b) reveals that, of the 232 individuals assigned to the EI and found to be at moderate or high risk for crack cocaine use at baseline, 22%

(n = 52) reported worsened levels of risk related to crack cocaine use compared with 31% (n = 53) of the 173 individuals with the same level of risk from the SI.

We also were interested in whether the difference between the two interventions was largely a factor of gender. As shown in Table 3c, men in the EI were more likely to improve than men in the SI. Although women in the SI group were not statistically different from the women

Table 4. Number of sex partners at baseline and follow-up
St. Louis EOTO full sample (N = 725)

Level	At follow-up				Total (at baseline)
	None (0 partners)	Low (1 partner)	Moderate (2 partners)	High (>2 partners)	
None (0 partners)	65 9%	46 6%	3 0%	6 0%	120 17%
Low (1 partner)	72 10%	259 36%	30 4%	18 2%	379 52%
Moderate (2 partners)	16 2%	53 7%	20 3%	17 2%	106 15%
High (>2 partners)	16 2%	40 6%	21 3%	43 6%	120 17%
Total (at follow-up)	169 23%	398 55%	74 10%	84 12%	725 100%

Table 4a. Number of sex partners at baseline and follow-up
Standard intervention group (N = 308)

Level	At follow-up				Total (at baseline)
	None (0 partners)	Low (1 partner)	Moderate (2 partners)	High (>2 partners)	
None (0 partners)	25 8%	18 6%	— —	4 1%	47 15%
Low (1 partner)	33 11%	112 36%	15 5%	7 2%	167 54%
Moderate (2 partners)	6 2%	18 6%	10 3%	7 2%	41 13%
High (>2 partners)	8 3%	16 5%	6 2%	23 7%	53 17%
Total (at follow-up)	72 23%	164 53%	31 10%	41 13%	308 100%

Table 4b. Number of sex partners at baseline and follow-up
Enhanced intervention group (N = 417)

Level	At follow-up				Total (at baseline)
	None (0 partners)	Low (1 partner)	Moderate (2 partners)	High (>2 partners)	
None (0 partners)	40 10%	28 7%	3 1%	2 0.5%	73 18%
Low (1 partner)	39 9%	147 35%	15 4%	11 3%	212 51%
Moderate (2 partners)	10 2%	35 8%	10 2%	10 2%	65 16%
High (>2 partners)	8 2%	24 6%	15 4%	20 5%	67 17%
Total (at follow-up)	97 23%	234 56%	43 10%	43 10%	417 100%

Table 4c. Change in number of sex partners between groups and by gender

	Overall			Men			Women		
	Standard (n = 308)	Enhanced (n = 417)	P	Standard (n = 196)	Enhanced (n = 246)	P	Standard (n = 112)	Enhanced (n = 171)	P
Percent improved	73%	76%	NS	75%	75%	NS	69%	78%	0.090

Table 5. Frequency of condom use at baseline and follow-up

St. Louis EOTO full sample (N = 725)

Level	At follow-up					Total (at baseline)
	No sex	Never (0%)	Sometimes (less than 100%)	Always (100%)		
At baseline	No sex	65 9%	25 3%	11 2%	19 3%	120 17%
	Never (0%)	72 10%	236 33%	53 7%	57 8%	418 58%
	Sometimes (less than 100%)	10 1%	26 4%	27 4%	14 2%	77 11%
	Always (100%)	22 3%	18 2%	13 2%	57 8%	110 15%
	Total (at follow-up)	169 24%	305 42%	104 14%	147 20%	725 100%

in the enhanced group in terms of reduction of crack cocaine use, the difference was in the expected direction.

Number of sexual partners. As presented in Table 4, the risk level associated with the number of sex partners at baseline and follow-up was defined as "low" for persons who had sex during the past 30 days with one partner, "moderate" for people who had sex with two partners, and "high" for those who had sex with three or more partners. Overall, 75% of the sample was found to have reduced their number of sex partners, maintained a one-partner relationship between baseline and follow-up, or reported abstinence at both time periods. More precisely, of the 120 individuals found to be at high risk at baseline due to their multipartner relationships, 47% ($n = 56$) became monogamous or abstained. On the other hand, of the 379 individuals found to be at low risk, 87% ($n = 331$) remained with one partner or abstained.

As shown in Tables 4a and 4b, although 76% of the EI group improved compared with 73% of the SI group, this difference was not statistically significant. However, when the data were stratified by gender, there was a trend ($P = 0.09$) toward improvement among women assigned to the EI compared with those assigned to the SI. No

statistically significant difference or trend in improvement was found for men (Table 4c).

Frequency of condom use. Thresholds of risk related to condom practices at baseline and follow-up were based on the frequency of condom use during the prior 30 days. Four levels of risk were defined: "no sex" in the prior 30 days; "never" for individuals who were sexually active but did not use condoms in that time period; "sometimes" for those who used condoms less than 100% of the time; and "always" for those who used them every time they had sex in the prior 30 days. For condom use, "improved" is defined as no sex or always using condoms at follow-up, and "worsened" is defined as never or sometimes using condoms at follow-up. As shown in Table 5, overall, in terms of condom use, the EOTO sample worsened more than it improved (56% vs. 44%). Of the 230 individuals who either reported abstinence or reported having always used condoms in the 30 days prior to the baseline, 29% ($n = 67$) changed their condom use habits by becoming sexually active without protection or by not always using condoms. In addition, 69% of the 495 individuals who at baseline were already at risk did not improve their risk level. As shown in Tables 5a and 5b, the standard and

Table 5a. Frequency of condom use at baseline and follow-up

Standard intervention group (N = 308)

Level	At follow-up					Total (at baseline)
	No sex	Never (0%)	Sometimes (less than 100%)	Always (100%)		
At baseline	No sex	25	10	3	9	47
		8%	3%	1%	3%	15%
	Never (0%)	34	103	23	23	183
		11%	33%	7%	7%	59%
	Sometimes (less than 100%)	5	7	14	5	31
	2%	2%	5%	2%	10%	
Always (100%)	8	10	2	27	47	
	3%	3%	1%	9%	15%	
Total (at follow-up)	72	130	42	64	308	
	23%	42%	14%	21%	100%	

Table 5b. Frequency of condom use at baseline and follow-up

Enhanced intervention group (N = 417)

Level	At follow-up					Total (at baseline)
	No sex	Never (0%)	Sometimes (less than 100%)	Always (100%)		
At baseline	No sex	40	15	8	10	73
		10%	3%	2%	3%	18%
	Never (0%)	38	133	30	34	235
		9%	32%	7%	8%	56%
	Sometimes (less than 100%)	5	19	13	9	46
	1%	5%	3%	2%	11%	
Always (100%)	14	8	11	30	63	
	3%	2%	3%	7%	15%	
Total (at follow-up)	97	175	62	83	417	
	23%	42%	15%	20%	100%	

Table 5c. Change in frequency of condom use between groups and by gender

	Overall			Men			Women		
	Standard (n = 308)	Enhanced (n = 417)	P	Standard (n = 196)	Enhanced (n = 246)	P	Standard (n = 112)	Enhanced (n = 171)	P
Percent improved	44%	43%	NS	46%	47%	NS	40%	38%	NS

enhanced groups did not differ in their risk level of condom use from baseline to follow-up. To further evaluate potential differences in the groups, the change status was stratified by gender (Table 5c); no differences were found. However, because the response to our SIs and EIs was so poorly related to condom use, we focused on a within-group comparison. Although not shown, there was a trend ($P = 0.076$) for women assigned to the EI to do

worse than men assigned to the same intervention. This trend was not found in the SI group.

DISCUSSION

Our findings have shown that, in general, this out-of-treatment sample improved regarding high risk behavior. Specifically, 80% of this sample stopped or reduced crack

cocaine use or maintained a lower level of crack cocaine use. Persons in the peer-delivered EI group were statistically significantly more likely to reduce their crack cocaine use than those assigned to the SI (83% vs. 76%). Also, our EI proved to be more beneficial to men than did the SI. Our findings suggest that our intervention for crack cocaine use should be more women centered to foster improvements among them as well.

Sexual behaviors have been found to be more difficult to change compared with drug-using behaviors, and our study confirmed this finding. Although our sample was successful overall in reducing the number of sex partners, maintaining one-partner relationships, or abstaining from sex, there was no difference between the standard and enhanced groups. However, women assigned to the EI were slightly more likely than women in the SI to improve in this area. Our findings corroborate those of Calsyn and colleagues,¹² Chitwood and Comerford,¹³ and Catania and colleagues,¹⁴ who found that it is easier for drug users to reduce their number of sex partners than increase the frequency of condom use. Despite our best efforts in demonstrating proper condom use, distribution of male and female condoms, and instruction on the value of protection during sex, the EOTO sample worsened more than it improved (56% vs. 44%). Furthermore, the standard and enhanced groups did not differ in their risk level of condom use from baseline to follow-up.

Because there was a trend for women assigned to the EI to do worse than men assigned to the same intervention, future work should be directed toward tailoring separate interventions for women. These interventions should focus on power differentials in negotiating condom use, how to use the female condom, assertiveness training, and communication skills. The lack of improvement may in part be attributed to the nature of sexual behavior. For example, unlike drug-using behavior, which oftentimes occurs in groups, sexual behaviors occur more often in private, thus lacking the opportunity for peer modeling of positive behaviors. Also, since condom use requires the consent of both partners, future interventions would benefit from inclusion of the sex partner, with specific prevention messages aimed at the dyad. NIDA-funded studies that utilize this approach are under way, and results of those studies should inform the field about the logistics of including partners in interventions.

Furthermore, our analytic approach may for two reasons be more restrictive than that used by others: our improved and worsened dichotomy and our intent-to-treat analyses. First, our approach to categorizing individuals who maintained a low level of risk with those who

reduced their risk (and categorizing individuals who maintained a high level of risk with those who worsened) might be criticized as being misleading. However, this approach was chosen over others so as not to misclassify individuals and bias our results. In other approaches to the analysis, no change from baseline to follow-up is indicated with "zero" change. Thus, individuals who are either maintaining a low risk level or not changing their high risk behavior receive the same code. We evaluated the difference in results when the "no change-low risk" and "no change-high risk" individuals were taken out of the analyses. Slight differences were found, all in the direction of finding slightly more (but not clinically meaningful) improvement in the EI vs. SI. None of the "not statistically significant" findings became so with this alternate analysis. In other words, the findings as presented in this chapter are more conservative than those that exclude the "no-change" group and are based on what we believe to be an important analytic strategy. Second, as stated, we used an intent-to-treat analysis. An alternative—effectiveness analysis—includes in the denominator only individuals who actually attended an intervention. This alternate approach would need to be justified by showing that the statistical power of the intent-to-treat sample is compromised. Although eventually we may further explore our data with dose-response analyses, for now, preliminary analyses indicate the difficulties in executing such an approach. For example, one must decide if zero sessions attended are equivalent in both the intent-to-treat sample and the SI group. One also might need to explore Receiver Operating Characteristic (ROC) curves¹⁵ to determine what threshold number of enhanced sessions is the minimum number associated with behavior change; that minimum number will vary for each behavior. If persons attending more than four sessions (the required number) were more likely to change certain behaviors, we would design an intervention that encompassed more than four sessions.

Future longitudinal studies also might benefit from designing long-term interventions that take into account the change status of an individual at an interim follow-up in order to tailor the intervention to recalcitrant behavior. Specifically, we might assign those individuals in the "worsened" areas of the matrix to a more intensive intervention and tailor a different intervention for those who have shown the ability to improve. This effort might be especially useful if peers delivered the information, thus increasing the importance of "each one teaching one."

Because EOTO is still ongoing, we will have the opportunity to refine these analyses with a larger sample

of women and injectors. As Cunningham-Williams and colleagues¹⁶ have shown, CHOWs from a number of Cooperative Agreement sites successfully enrolled women through street outreach; CHOWs in St. Louis were successful at targeting current drug injectors for screening and were very successful in enrolling noninjectors into the project.

While trying to change drug users' risk behaviors, the EOTO study also has met the more difficult public health challenge for community-based drug abuse research. Specifically, we are proud of our (1) partnership with the St. Louis Public Health Department; (2) ability to

reach and enroll at-risk out-of-treatment drug abusers; (3) history of excellent follow-up rates;¹⁷ and (4) dedicated, dependable, and caring staff.

In conclusion, drug abuse researchers must consider their mission to be tied to the public health needs of their community. Only if this critical tie-in is accomplished will NIDA's goals for community research be realized.

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References

- Liebman J, LaVerne DK, Coughney K, Hua S. Injection drug users, drug treatment, and HIV risk behavior. In: Brown BS, Beschner GM, and the National AIDS Research Consortium, editors. *Handbook on risk of AIDS: injection drug users and their sexual partners*. Westport (CT): Greenwood Press; 1993.
- McCusker J, Koblin B, Lewis BF, Sullivan J. Demographic characteristics, risk behaviors, and HIV seroprevalence among intravenous drug users by site of contact: results from a community-wide HIV surveillance project. *Am J Public Health* 1990;80(9):1062-7.
- Cottler LB, Compton WM, Price RK, Shillington AM, Claverie DJ, Works JE, et al. St. Louis' efforts to reduce the spread of AIDS in IVDUs. In: Inciardi JA, Tims F, Fletcher B, editors. *Innovative approaches to the treatment of drug abuse: program models and strategies*. Westport (CT): Greenwood Press; 1993.
- Cottler LB, Cunningham RM, Compton WM. The effect of treatment on high risk sexual behaviors and substance use: St. Louis' effort to reduce the spread of AIDS among injection drug users. In: Tims FM, Inciardi JA, Fletcher BW, Horton AM, editors. *The effectiveness of innovative approaches in the treatment of drug abuse*. Westport (CT): Greenwood Press; 1997. p. 232-48.
- Price RK, Cottler LB, Compton WM, Shillington AM, Claverie D, Asmus G, et al. Providing free drug abuse treatment to reduce the spread of AIDS in St. Louis: barriers to care. In: Fletcher BW, Inciardi JA, Horton AM, editors. *Drug abuse treatment: the implementation of innovative approaches*. Vol. II. Westport (CT): Greenwood Press; 1995.
- Cabral RJ, Galavotti C, Garguillo PM, Armstrong K, Cohen A, Gielen AC, et al. Paraprofessional delivery of a theory based HIV prevention counseling for women. *Public Health Rep* 1996;111 Suppl 1:75-82.
- Centers for Disease Control and Prevention (US). *NCPS AIDS demonstration projects: what we have learned, 1985-1990*. Atlanta: Department of Health and Human Services, Public Health Service; 1992.
- Pulley LV, Malister AL, Kay LS, O'Reilly K. Prevention campaigns for hard-to-reach populations at risk for HIV infection: theory and implementation. *Health Educ Q* 1996;23:488-96.
- Beardsley M, Goldstein MF, Deren S, Tortu S. Assessing intervention efficacy: an example based on change profiles of unprotected sex among drug users. *J Drug Issues* 1996;26:635-48.
- Cunningham RM, Cottler LB, Compton WM. Are we reaching and enrolling at-risk users for prevention studies? *J Drug Issues* 1996;26:541-60.
- Wechsberg WM, MacDonald BR, Dennis ML, Inciardi JA, Surratt H, Leukefeld C, et al. The standard intervention for reduction in HIV risk behavior: protocol changes suggested by the continuing HIV/AIDS epidemic. Bloomington (IL): Chestnut Health Systems/Lighthouse Institute Publications; 1997.
- Calsyn DA, Saxon AJ, Freeman G, Whittaker S. Ineffectiveness of AIDS education and HIV antibody testing in reducing high risk behaviors among injection drug users. *Am J Public Health* 1992;82:573-5.
- Chitwood DD, Comerford M. Drugs, sex and AIDS risk: cocaine users versus opiate users. *Am Behav Sci* 1990;33:465-77.
- Catania J, Coates TJ, Kegeles S, Ekstrand M, Guydish J, Bye L. Implications of the AIDS risk-reduction model for the gay community: the importance of perceived sexual enjoyment and help-seeking behaviors. In: Mays VM, Albee GW, Schneider SF, editors. *Primary prevention of AIDS: psychological approaches*. Newbury Park (CA): Sage; 1989.
- Swets JA, Pickett RM. *Evaluation of diagnostic systems: methods from signal detection theory*. New York: Academic Press; 1982.
- Cunningham-Williams RM, Compton WM, Desmond DP, Wechsberg W, Zule WA, Deichler P. Reaching and enrolling drug users for HIV prevention: a multi-site analysis. *AIDS Educ Prev*. In press 1998.
- Cottler LB, Compton WM, Ben-Abdallah A, Horne M, Claverie D. Achieving a 96.6 percent followup rate in a longitudinal study of drug abusers. *Drug Alcohol Depend* 1996;41:209-17. ■